

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 5**  
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CHICAGO, ILLINOIS 60604-3590

Reply to the Attention Of: SR-6J

March 17, 2016

Mr. Todd Konechne  
The Dow Chemical Company  
1111 Washington Street  
Midland, MI 48640

RE: Draft Tittabawassee River Segments 4 and 5 Response Proposal  
Tittabawassee River, Saginaw River & Bay Site, Michigan  
EPA Document #EPA2016.003

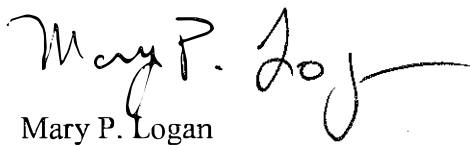
Dear Mr. Konechne:

The United States Environmental Protection Agency (EPA), in consultation with the Michigan Department of Environmental Quality (MDEQ) (jointly, the Agencies), has reviewed the draft Tittabawassee River Segments 4 and 5 (OUI) Response Proposal (RP 4&5) for the Tittabawassee River, Saginaw River & Bay site. The draft RP 4&5, dated December 18, 2015, was submitted by The Dow Chemical Company (Dow) pursuant to requirements of the January 2010 Administrative Settlement Agreement and Order on Consent (AOC), and Section VI, Task 8 of the Statement of Work (SOW) – Appendix A to the AOC.

The Agencies have reviewed the draft RP 4&5 in accordance with Sections X and XI of the AOC. The Trustees also provided review comments. Consolidated comments are attached. In accordance with paragraph 37 of the AOC, EPA is requesting Dow to review the comments, revise the RP 4&5 accordingly, and resubmit the document in accordance with the AOC and SOW. EPA is requesting that Dow submit the revised RP 4&5 no later than May 16, 2016. EPA is also requesting a written response to comments along with the revised document.

Please contact me at (312) 886-4699 if you have any questions.

Sincerely,



Mary P. Logan  
Remedial Project Manager

cc via email: A. Taylor – MDEQ  
L. Williams – FWS  
T. Prendiville, D. Russell, J. Cahn, C. Garypie – EPA  
J. Pistro – Dow  
S. Hayter, K. Bell – Ramboll/Environ

**Agencies' Review Comments on the  
Draft Tittabawassee River Segments 4 and 5 Response Proposal, Dated December 18, 2015  
Tittabawassee River, Saginaw River & Bay Site, Michigan**

Review comments were received in many different formats. EPA has attempted to consolidate comments for content, but have retained varied formats. If comments are unclear, please contact EPA as soon as possible.

**A. Major Comments**

1. Superfund non-time critical removal authority is being used for this Response Proposal. As such, and pursuant to the AOC, any decision made by EPA, in consultation with the MDEQ, will not constitute the final remedy for Segments 4 and 5 – a final remedy determination will be made in a later Record of Decision (ROD), after a full risk assessment has been completed. At the time of the final ROD (or earlier, if warranted) the Agencies will evaluate whether additional remedial action objectives (RAOs) and response actions may be necessary for Segments 4 and 5. The evaluations used in this document are sufficient to support the currently identified bases for the planned non-time critical removal action (NTCRA). However, future work will need to evaluate all relevant exposure pathways and receptors and ensure that risks are at acceptable levels.
2. Sediment Management Areas (SMAs)
  - a. The Agencies agree that the two areas currently identified in Segments 4 and 5 should be SMAs. Pursuant to the AOC and SOW, other SMAs may be identified in the future, if warranted.
  - b. The criteria to identify SMAs is somewhat unclear. The identification of SMAs and the criteria may need to be refined over time, depending on the success of the NTCRAs at meeting the RAOs.
  - c. Additional areas of interest/potential SMA(s) – There are other areas in Segments 4 & 5 that need more analysis in the RP, in technical meetings or in a supplemental technical memo to be developed on an agreed upon schedule. There are two areas that were discussed in technical meetings that are not addressed in the RP that may be areas of interest of interest or that may need more evaluation as potential SMAs. One area is on the northeast side centered at approximately station 801 (lower II) and the second center channel around station 772 (upper II). The Agencies are also taking a harder look at additional sediment data in Segments 4 & 5. The table of LWAs/core length/sample length and TEQ requested below will greatly facilitate this review.
  - d. The SMA boundaries are preliminary and may need to be further refined. Additional delineation is likely to be necessary as part of the design phase of this response. The actual TEQ concentrations present in and around potential SMAs needs to be considered for the final design.

3. Bank Management Areas (BMAs)

- a. The Agencies generally agree that the sixteen areas currently identified in Segments 4 and 5 should be BMAs. However, some refinements may be needed during design. Additionally, pursuant to the AOC and SOW, other BMAs may be identified in the future, if warranted.
- b. Section 3.9 and Figure 3-15 process – At this time the Agencies are not “approving” the BMA identification process and will continue to work with Dow to evaluate approaches to prioritize the Tittabawassee River banks. As we have discussed and commented on previous RPs, the Agencies consider this to be an adaptive management approach that will continue to be refined in order to meet the shared goal of addressing the worst TEQ contributing banks first. The current stability and TEQ criteria identifying prioritized banks may need to be refined over time, depending on the success at meeting RAOs.
- c. Refinements to the BMA identification process, if needed, could consider: surface TEQ (because the high TEQ is already present at the surface and even relatively low amounts of erosion could present a problem); direct inclusion of bank pins and/or tree roots (as opposed to using them for validation); historic air photo evaluation; evidence of mass wasting; and possibly other evaluation metrics.
- d. Because Segment 4 & 5 work is anticipated to be concurrent with Floodplain work, it is important that Dow and the Agencies take a pragmatic look at all that might ultimately need to be done to a property to minimize disruption/ construction/ access to the subject properties.

4. This RP proposes “rules of thumb” for triggering implementation of response actions at SMAs. The scope (volume, areal footprint, etc.) of the SMA alternatives then reflect the proposals, particularly for SMA 5-1. These “rules of thumb” are generally unacceptable to the Agencies and the RP must be revised (both in the text and on the figures that illustrate the responses). More specifically:

- a. Section 5.1.2, 3<sup>rd</sup> paragraph states “Under this alternative, caps would be placed in areas where the depth of the elevated TEQ deposit is shallower than 4 ft below the sediment surface. These caps would supplement the existing natural sediment deposits, where they exist, that overlie subsurface TEQ deposits.” This general depth rule is not acceptable. The capping alternative needs to reflect that isolation of the entire SMA footprint (i.e., 0.7 acres for SMA 5-1) will be addressed in both design and long-term monitoring. However, the Agencies do recognize that, in some cases, natural capping or MNR may have attained the isolation intended by capping. Please consider re-writing as follows (or similar): “Under this alternative, caps would be placed on the SMA to isolate the contaminated material from the biologically active zone and to ensure stability of the TEQ deposit. In some portions of an SMA existing cleaner natural sediment deposit may overlie the elevated subsurface TEQ deposit. In such cases, as appropriate, the design of the cap may incorporate both a constructed cap and the existing natural cap.” Please delete the last sentence of this paragraph. Then, Section 6 can discuss specific conditions where this may occur.

- b. Section 5.1.3, page 60, 3<sup>rd</sup> paragraph states “Sediment removal would target the depth of contamination to a maximum depth of 4 ft.” Also “If elevated TEQ levels are present at depths greater than 4 ft, existing sediment or newly deposited material in the removal areas would be used to provide a natural cap over the contaminated material and isolate the buried sediment from the biologically active zone.” This general depth rule is not acceptable. Removal only alternatives should address the entire TEQ deposit. The Agencies recognize that there are SMA-specific considerations that influence the potential tradeoffs of this alternative (effectiveness and implementability), but those considerations can be explicitly discussed in Section 6. Also, there may be cases where it does not make sense to develop a removal only alternative at a particular SMA, again – discuss in Section 6. Preliminary depth cuts for both SMAs should be re-evaluated in the revised RP.
  - c. Modifications to additional parts of the RP, especially Section 6 and some figures will be needed, based on these comments.
- 5. Combination remedy for SMA 5-1 – Consistent with comment 4, above, Alternative 4 for SMA 5-1 should be reconfigured to address the entire 0.7 acre footprint and appropriate TEQ deposit depths. As appropriate, it can include removal, constructed cap, and either natural cap or MNR.
- 6. SCOIs – On December 18, 2015, Dow submitted the “Sediment and Bank Soil SCOI Screening for Segments 4 through 7, Tittabawassee River.” The Agencies have not completed our review of the SCOI screening, but have commented previously on the SCOI evaluations done in upstream segments. EPA has determined that the bases for action presented in this RP 4&5 are appropriate to proceed with development and selection of NTCRA response options for the currently identified Segments 4 & 5 SMAs and BMAs. The Agencies are not “approving” the conclusions about SCOIs found in Section 3.7. Comments on the SCOI screening will be sent separately. SCOIs must be fully addressed in the Task 10 residual risk assessment, may result in additional Segments 4 & 5 analysis/work and/or post-construction monitoring.
- 7. Benthic Community – Section 3.5.1 contains a brief discussion of Segments 1 and 2 benthic community conditions. The Agencies have questions about the conclusion that “the benthic community in Segments 1 and 2 is diverse, abundant, and comparable to ...reference conditions” because there is some uncertainty about how representative the sampling locations were and validation of the site selection, observations, scoring, and calculation of metrics. Also, as noted, no sample locations were included in Segments 3, 4 or 5. Benthos and other biological receptors (e.g. fish, birds, reptiles, and amphibians) will need to be considered in the ecological risk assessment. As such, the Trustees have recommended that it might be appropriate to perform benthic surveying to have baseline information on benthic communities, including freshwater mussels, prior to implementation of work on Sediment Management Areas in Segments 4 and 5.

## **B. Specific Comments**

8. Executive Summary – There may be changes to this summary based on the comments on the main text. Also, please clarify that the Response Proposal (RP4/5) may not address all of Dow’s remedial obligations with respect to the segments, and that further work to address other exposure pathways such as human direct contact and ecologic risk will be conducted as part of the Floodplain Response Proposal and/or the Task 10 residual risk assessment(s).
9. Section 2.3, p. 6. “Several dams were constructed around this time to provide hydroelectric power and a clean water supply. The dams also controlled river flows and limited peak flood events.” *Comment:* The Trustees believe that this paragraph does not provide a good understanding of the influence of dams in the river downstream of Midland. Although four hydropower dams were constructed on the Tittabawassee River, all are upstream from the City of Midland. Fluctuations in flow from the Sanford Dam affect water levels and erosion in these segments. The Dow Dam at Midland is a barrier to fish passage
10. Section 2.5 – PCOI Distributions in the River. The duration of the period of direct discharge to the river is not known. It would be more accurate to state (additional/modified language in ***italic boldface***): ***Beginning with the direct discharge period in the early 1900’s, the waste anode and cell body particles*** containing the PCOI contaminants mixed ....(or similar).
11. Section 2.6.1 - In Channel Geologic Stratigraphy, Page 9. This section should be clarified to indicate that glacial till does contain till sand units that can be extensive. These till sands are commonly used for as a potable water source in the study area.
12. Section 2.7.5 – Island MM is in Segment 5, not Segment 4.
13. Section 3.2, page 19, 2<sup>nd</sup> paragraph and 3.2.1, page 21, 5<sup>th</sup> paragraph – Were additional composite samples collected in 2015? If so, discuss here and update other sections of the report if the results are available. Also please discuss the change in how the 2015 sediment ICS processing differed from the earlier samples, as it may help interpret the results and their variability. Please note that the Agencies have not fully approved this methodology (see the approval with modification letter from EPA to Dow dated May 10, 2012), but are open to working with Dow to continue to refine this methodology to improve its potential usefulness, especially for long term trend monitoring and to better understand surficial sediment TEQ concentrations
14. Section 3.2.1, pages 19 -22:
  - a. Previously in the review of the response proposals for Segments 2 and 3, the DEQ has requested that Figures 3-2A and B and 3-3A -D be revised or supplemented with figures that show TEQ concentrations less than or equal to 100 parts per trillion (ppt) TEQ and greater than 100 ppt TEQ but less than or equal to 500 ppt. The requested modifications were not made. As an alternative, please expand the section to include a new table that lists the length weighted average TEQs (LWAs) for each of the cores and identifies the core intervals (length and TEQ) used to calculate the LWAs. In this

way the Agencies would have ready access to the information and could spot check the calculated LWAs and verify that the length of core used is appropriate.

- b. P. 21, 3<sup>rd</sup> paragraph *"The lateral and vertical distribution of TEQ levels based on the sampling and analysis conducted during 2007-2015 suggest that contiguous deposits of elevated TEQ levels in Segments 4 and 5 are confined to areas on the southwest side of Middle Reach II and the northeast side of upper-Reach KK."* See Major Comment 2.b above, regarding potential additional SMAs.
- c. Please provide stationing for Figure 3-6
- d. Please consider augmenting this section with a description/calculation of the uncertainty associated with the composite surface sample average concentrations and the surface weighted average concentration presented for Segments 4 & 5.
- e. Please include and discuss the bed load sampling results (if any) for Segments 4 & 5.

15. Section 3.2.3 – Core Log Review:

- a. The text notes "oily/greasy" at II-787+00-IC983. This location appears to be a typo. Please correct.
- b. It is not appropriate to conclude that there is no indication of "atypical sediment conditions" based on the text of this section. Analytical data for the SCOIs has not been collected from the "oily/greasy" core location. Atypical conditions have been identified by the core log review. Follow-up assessment at this location for SCOIs may be needed. Please also note if any other review of the boring logs was conducted to determine if elevated photoionization detector (PID) reading or odor was present at this or any other Segment 4 & 5 locations.

16. Section 3.2.2 – In-Channel Sediment Secondary Constituents of Interest: See Major Comment 6, above.

17. Section 3.3.1.1 – Nature and Extent of Bank Soil Contamination, Page 23 Last Paragraph. This paragraph indicates "...that shoreline and high surface/upland geomorphic units along the bank do not contain deposits of TEQ that are likely to be an erosional source to the river,...". The Agencies do not necessarily agree with this conclusion, but acknowledge that these deposits have not been prioritized for response because the thickness of the deposits is small relative to the post-industrial levy deposits and/or because of what is known about TEQ levels. Depending on the success of addressing the targeted BMAs' these deposits may need to be reconsidered.

18. Section 3.3.2.1 – PCOI Results from 2006 – 2014 Bank Soil Coring

- a. Similar to the requests on SMAs, the Agencies would find it more useful if Figures 3-8A – 8F showed more refined TEQ concentration intervals (less than or equal to 250 ppt TEQ and greater than 250 ppt but less than or equal to 500 ppt TEQ and greater than 1000 ppt but less than or equal to 2000 ppt TEQ, consistent with the clean-up criteria identified in the Floodplain Response Proposal). This could help in

understanding the BMA prioritization and for integrating the bank areas with the floodplain assessment/cleanup.

- b. Page 24. Paragraph 1. The RP states that “The bank LWA TEQ level was calculated to the bottom of the bank because . . . to be a potential source to the river.” More explanation may be needed here. For example, Figure 3-8B show a core located near 780+00 that has about 5 feet of >10,000 ppt TEQ present below the “Approximate Bottom of Bank” line. How does this match the CSM? Might these conditions be indicative of potential shoreline SMA deposits?
  - c. General Comment. Please expand the section to include a new table that lists the LWAs for each of the bank cores and identifies the core intervals (length and TEQ) used to calculate the LWAs. In this way the Agencies would have ready access to the information and could spot check the calculated LWAs and verify that the length of core used is appropriate.
19. Section 3.3.2.3 – The BFC TEQ results may be important in that they show the actual exposed concentration of bank soils that may be eroding into the river. As noted in previous comments on this issue, the surface concentrations of TEQ in bank soils may be an important factor in determining what banks are prioritized for stabilization and what type of stabilization is proposed (i.e., for banks with high TEQ currently exposed at the surface, stabilization technologies that include a barrier component may be more appropriate
20. Section 3.3.3 – Bank Soil SCOIs: See Major Comment 6, above.
21. Section 3.4.2 – Bed Pin Analysis
- a. Have the rebar bed pins been removed and replaced with a GPS measure? If so, explain that change in procedure, and when it took place.
  - b. Please include 2015 bed pin data in Appendix C3.
  - c. The bed pin cross sections demonstrate an active bed depth of greater than 2 feet in a number of locations in Segments 4 and 5.
  - d. There are locations where additional bed pin transects may be appropriate to evaluate TEQ deposits that have not currently been identified as SMAs. Consideration should be given to how these deposits will be monitored in the future.
  - e. During our recent technical meetings and review of the 2014 Annual Report (received in December of 2015) it was reported by Dow that some bed pin transects had been removed from service in upstream segments. This needs discussion. In some cases bed pin monitoring may be necessary to continue to verify the stability of deposits that have not been removed or capped.
22. Section 3.5.3, Threatened and Endangered Species

- a. The text states that there are not documented occurrences of Indiana bats in Saginaw or Midland Counties, but Table 3-4 lists both as County(ies) of Documented Occurrence. Please reconcile.
  - b. The 1<sup>st</sup> paragraph states: “A summary of federal- and state-listed threatened and endangered species that could be associated with Segments 4 and 5 is provided in Tables 3-4a and 3-4b. Sources used in this updated evaluation include federal (USFWS 2014) and state (MNFI 2014) lists of threatened and endangered species.” Both the USFWS and MNFI references here should be re-checked and updated to 2016, or at least late 2015. Also, footnote a to Table 3-4b states that MNFI was checked in “January 18, 2012.” This needs to be updated.
  - c. The Trustees have recommended that surveys be conducted for freshwater mussels and Indiana bats, and planning for measures to be taken if listed species are found.
23. Sections 3.7.2 and 3.7.3 – Direct Contact Ecological Receptors, Page 35. Last paragraph. The RP4/5 text indicates that the SCOI data set is spatially comprehensive. This is a bit of an overstatement. The data set may be adequate to identify responses. Additional data collection may be necessary for residual risk assessment. Also, see Major Comment 6.
24. Section 3.8.1, Identification of SMA Locations in Segments 4 and 5
- a. The RP would benefit from more detail on the multiple lines of evidence cited for the identification of a SMA. What concentration is considered elevated? What constitutes a contiguous deposit? How are the TEQ composite sample results factored into the evaluation?
  - b. See comment 2.b regarding potential other SMAs.
  - c. Page 34. Paragraphs 3 and 4. The 10,000 ppt TEQ level was established as an Interim Response Activity level to help determine if early action was needed to control short term transport risk. The 10,000 ppt TEQ interim response value is not a final cleanup criterion.
  - d. 3<sup>rd</sup> paragraph and Section 3.8.2.1 – There are statements here that 7 cores have individual TEQs greater than 10,000 ppt, but figures 3-11 and 3-12 show 5 cores with individual TEQs greater than 10,000 ppt included in the SMA boundary. Please provide some discussion of the other 2 cores (e.g., surficial bedload).
  - e. The Agencies do not necessarily agree with the description of the bed stability in middle Reach II. The statement “...and bed pin measurements within the SMA boundary show minimal change in the sediment bed elevation between monitoring events...” may not be relevant to the question of bed stability over the long term. The important measure is the overall change in the bed depth over time, not between monitoring events. We are concerned with the loss of the deposit over the long term – not just between monitoring events. Bed pin transect 783+00, which is squarely

within the proposed SMA, shows up to 4.2 feet of change in bed depth at and proximal to the proposed SMA.

- f. Likewise, the description of bed stability in upper KK indicates that the deposit is located 1 foot below the sediment surface. Bed pin analysis in this area show over 1 foot of change in bed elevation over the period when measurements have been taken. The active bed appears to impinge on the deposit.
25. Section 3.8.2.3 – Other Areas of Interest in Segment 4 and 5. Page 35. Paragraph 4. Please revise the last sentence in this paragraph which states “...do not represent a contiguous deposit of elevated TEQ”. The data indicate a small but elevated TEQ deposit. The analysis should also note where in the cores the TEQ is elevated. It is noted that there are no bed pins located at this deposit and this should be considered for future monitoring.
26. Section 3.9 – Bank Management Areas, General Comments
- a. As noted below, the Agencies are requesting the underlying data sets that support the bank stability lines of evidence (LOE) and the relative TEQ indices. These might be in existing data sets, or in new figures, tables, or appendices to supplement the RP.
  - b. The DEQ recommends changing the wording for “bank stability” in this section and on Figure 3-15 to “**current** bank stability” to reflect that the initial evaluation is at a point in time and that ongoing evaluation of the stability of high TEQ bank deposits will be part of the long-term monitoring
27. Section 3.9.1 – Banks in Hardened Surface Areas. These areas may contain high TEQ indices. If so, they should be identified and tracked/monitored. Bank failures occur and modifications to bank treatments can occur overtime. Also, representative photos of each of the banks being excluded from evaluation would be useful because there are a wide range of bank hardening treatments and some are more effective than others.
28. Section 3.9.2 – Banks with Shoreline or Upland/High Surface Geomorphological Features. If the shoreline geomorphic units are not evaluated as part of the BMA determination process, and they contain elevated concentrations of TEQ, as appropriate, they may need consideration as a shoreline SMA and/or as part of the Floodplain response evaluation.
29. Sections 3.9.3 Bank Stability Evaluations
- a. Where does the bank stability evaluation data reside? The Agencies should have access to the data for each stability LOE by transect location, both for the site record and to review conclusions in the RPs. Some of the LOEs are summarized graphically on figures (e.g., undercutting, levels of exposed roots). The Agencies are requesting the data for each bank stability LOE either as an Appendix to the RP, in the site data base, or in another agreed form.
  - b. The RP does not appear to use bank pin and/or tree root data in the bank evaluation process. Where present, these LOEs should be compared to model-predicted erosion

rates and used to validate determinations of bank stability – especially when those banks are high TEQ index banks.

- c. Sections 3.9.3 and 3.9.3.7 – Section 3.9.3 states “The third step of the BMA evaluation process (Figure 3-15) focuses on assessing the current stability of the Segments 4 and 5 banks that were not in areas with hardened (e.g., riprap) banks or within shoreline or upland/high surface geomorphological units (i.e., those identified under Steps 1 and 2 above).” However, the results of stability evaluations reported in Section 3.9.3.7 seem to have reported stability only eliminating the hardened banks. For example, Segment 4 is reported as 6.9 miles, with 0.5 as hardened and 0.7 as shoreline or upland/high surface geomorphological units. If the process in 3.9.3 and on Figure 3-15 were followed, stability evaluations should be reported for 5.7 miles, but 6.4 are reported. However, it may be better in practice to continue to report the stability evaluation for all non-hardened surfaces, and certainly should be retained in the site data.

30. Section 3.9.3.6 – Model Predicted Bank Erosion Rate.

- a. The calculated rate appears to reflect an average rate over the entire bank full bank face within a 300 foot grid cell. Therefore, the model predictions need to be evaluated cautiously as the averaging process may mask local areas of erosion that may be significant. The bank model erosion rate LOE is a model prediction. When that prediction does not match the empirical LOEs then the model output may be suspect for that location.
- b. The rationale for selecting a 2.5 inch per year erosion rate as the threshold between high/moderate stability and low stability is not clear. Over two feet of erosion in ten years does not seem to be “stable” – especially with respect to contamination that is near or at the bank face.
- c. While the modeled magnitude of the erosion rate is useful for prioritizing the banks for action, the Agencies are not “approving” a modeled loss to the river of contaminated bank soil at less than 2.5 inches per year as being acceptable.

31. Section 3.9.4, Evaluation of Bank TEQ – Please provide the Relative TEQ Index for Segments 2 – 7 either as an Appendix to the RP, in the site data base, or in another agreed form. This should include the locations of each of the banks included in the Index, the length of the bank and the TEQ value(s) used to represent the bank segment. This is an important part of the site record as it is used to prioritize banks for remedial activities.

32. Section 3.9.5 – The bank lengths in each category do not quite add up. On page 44 it says there are 1.7 miles of intermediate TEQ banks, while on page 43 it talks about 0.7 and 1.1, which would be 1.8 miles.

33. Section 4.1 Segments 4 and 5 Conceptual Site Model and Basis for Action

- a. Neither Figure 4-1 nor the text addresses the pathway of floodplain soils eroding back into in-channel sediments. The magnitude and significance of this pathway is not currently known.
- b. Please note that fish also accumulate PCOIs through respiration of water (both fine particles suspended in water column and dissolved phase PCOIs).
- c. Page 46, last paragraph – This text indicates that the PCBs are not site-related. The Agencies are not necessarily in agreement with this, given that DEQ and Dow sampling of DNAPL in 2011 and 2012 from several of the Segment 1 SMAs has shown the presence of coplanar PCBs.

34. Section 4.2 - Remedial Action Objectives

- a. The RAOs should be linked to contributing to or achieving acceptable risk levels. The Task 10 assessment will need to evaluate other pathways and whether residual site contaminants achieve acceptable human health and ecological risks.
- b. Please note that the 2010 SOW also other General Response Objectives that will need to be evaluated, and met if needed, before response actions can be considered complete.
- c. Measurable Metrics. The RP identifies four measurable metrics. Discussion on how these metrics will be accurately measured, evaluated, and related to the identified Performance Objectives needs to be provided in the RP or Task 4 Monitoring Plans. Additionally, other metrics may be necessary to meet the requirements of the SOW

35. Section 4.3.1 Potential Chemical-Specific Requirements – Please modify footnote 7 as follows, or similar: <sup>FN7</sup> “It should be noted . . . As appropriate, cleanup criteria/numbers/non-numeric criteria (e.g., under Part 201, NREPA) may be evaluated as potential chemical-specific ARARs for any future risk-based responses. **Michigan’s Part 201 criteria were identified as a chemical-specific ARAR for the risk-based Tittabawassee River Floodplain Response Proposal.**”

36. Sec. 4.3.2.7 Michigan Natural Resources and Environmental Protection Act (NREPA) – Please consider re-writing for clarity: “Michigan Administrative Code Rule 901(a), **was promulgated as Rule 336.1901** under Part 55 of NREPA, Air Pollution Control ~~Michigan Administrative Code Rule 336.1901 (Rule 901) was promulgated under the authority of Part 55 (Air Pollution Control) of the NREPA, MCL 324.5501 et seq.~~ Rule 901(a)....”

37. Section 5

- a. 3<sup>rd</sup> Bullet – This bullet indicates that “...no long-term bank monitoring or management of the SMAs would be required after sediment removal” should be clarified with the addition of “***if the high TEQ deposit is removed,***” or similar. If a SMA deposit is only partially removed, then addition long term obligations will persist.

- b. 4<sup>th</sup> Bullet – Please add that in some cases bank soils may be removed and disposed of in order to achieve an appropriate bank angle for stabilization.
- c. 5<sup>th</sup> Bullet – The last sentence indicates that “no long-term bank monitoring or management would be required under this option” should be clarified with the addition of “*if the high TEQ deposit is removed,*” or similar. If a high TEQ bank is only partially removed and high TEQ soils remain, then addition long term obligations will persist.

38. Section 5.1.1, Monitored Natural Recovery

- a. Page 57, SMA 5-1 and 5-2 bed pin (and bathymetric data) shows that these deposits or portions of the deposits are currently vulnerable to exposure of or erosion of the elevated TEQ, and may not be good candidates for an entire MNR remedy.
- b. Page 57, 5<sup>th</sup> paragraph – The text indicates that: “A key determinant of the effectiveness of MNR within a given SMA is sediment bed stability, which is related to the dynamic equilibrium of the bed over annual time scales...” This statement ignores the importance of episodic events that can cause the deposit to be lost. The active bed depth (as determined by bed pin analysis) shows that portions of the deposits at SMA 5-1 and 5-2 may be at risk of loss without removal and/or capping

39. Section 5.1.2, page 59 – Cap monitoring may also need to assess the impact of the cap (if any) to sediment stability outside the cap.

40. Section 5.2 - BMA Response Alternatives

- a. This section correctly notes that the specific remedial technologies and process options most appropriate for BMAs depends on a number of location-specific issues. This list might be expanded to include the bank surface concentrations of PCOIs.
- b. General. It may be prudent to include a capping/cover component to the stabilization actions in the RP in order to provide the flexibility to address the potential for exposure pathways other than erosion to the river (i.e., direct contact with high concentration surficial soils).
- c. Chemical monitoring/additional bank surface TEQ characterization may be necessary to determine if other exposure pathways are relevant on the banks.

41. Section 5.2.2 – This section states that bank removal was done in Reach N. This is overstating the situation, and may be confusing. If anything, this should be discussed as a limited partial removal. The footprint of the removed area was small – not an entire bank stretch and O&M is still required for the remaining stabilized bank.

42. Section 6.2 – Common Elements – Page 65. The 6<sup>th</sup> bullet should indicate that Operations and Maintenance may be required for partial removals and combination responses.

43. Section 6.3.1.1 – Overall Protection of Human Health and the Environment

- a. Alternative 1 (MNR). Paragraph 2 indicates that “the bed overlying the majority of the SMA 5-1 (downstream of 782 +00) is stable.” This may be an overstatement. Figure B3-13 shows Bed Pin Transect RII-783+00 and shows elevation changes of up to 4.2 feet within or adjacent to the footprint of the SMA. Figure B3-14 shows Bed Pin Transect RII-785+00, with changes of 1.9 feet within the footprint of the SMA. These results and the upstream data indicate that MNR may not be an effective alternative for SMA 5-1.
- b. Alternative 1 (MNR). Page 67. Paragraph 3. The information provided in the RP4/5 do not support the statement “...buried SMA TEQ deposits have a relatively low likelihood of being eroded and transported downstream...” The bed pin data shows up to 1.2 feet of change over the time monitoring has been conducted. Some portions of SMA-2 have only a foot of relatively cleaner material over the high TEQ deposit. Contaminated materials may be present at or within the active bed depths. The shallow nature of the high TEQ deposit and the greater than one foot active bed may make MNR a poor alternative for this deposit.
- c. Alternative 3 (Removal), page 68, 1<sup>st</sup> paragraph, last sentence. Volumes of sediment may need revision based on comment 2.b. Please modify sentence (or similar): “The need for a post-removal residual sand cover would be determined **during design**, at the time of construction, or based on further sediment transport assessments.

44. Section 6.3.1.2 – Compliance with ARARs. Alternative 2 (In Situ Containment) and Alternative 4 identifies a 0.1 foot limit mandated by the Michigan Floodplain Act. This has been reviewed by DEQ Water Resources Division staff and DEQ has determined that no increase is allowed under the Act.

45. Section 6.3.1.4, Short-term effectiveness → do we want to add some more details than we’ve provided in the past RPs? For example:

- a. Section 6.3.2 (Implementability) provides some good information about preliminary access roads. Might it be useful to bring some of these details into the short-term effectiveness discussion to make it clear that construction of access and support areas also have effectiveness considerations, as well as implementation concerns? Then, there could be a distinction – better able to control and/or mitigate effects in fields vs. sparsely wooded vs. wooded.
- b. Alternative 2, page 69 – It would be useful to augment this section with a discussion of short-term construction impacts related to site access for armored cap placement (roads, heavy equipment, etc.).
- c. Alternative 3 – Might it be useful to try to provide some estimates of what the footprint of staging and dewatering areas might look like, especially for wet removal, and then briefly discuss related to the impact to the nearby area/ecosystem? For example, the sediment management/dewatering area for Reach D required about 4

acres of land. Since that was hydraulic dredging and a larger volume, the footprint for the Segment 4&5 SMAs might be smaller.

- d. Alternative 3 – The 3<sup>rd</sup> paragraph on page 71 mentions increased truck traffic. The RP provides volume estimates of sediment for removal (in Appendix C). Might it be useful to provide the approximate numbers of trucks transporting contaminated sediment this might mean?
46. Section 6.3.1.4, Alternatives 3 and 4 – The Trustees commented that bank and in-stream restoration following removal could also include placement of large woody debris to replace structure, differential flows, and woody surface area that provide microhabitats for production of algae, macroinvertebrates, and fish. Placing large woody debris at or near removal areas might help mitigate short-term impacts of the removal.
47. Section 6.3.1.4, Alternative 4 – Please address whether sheet pile around the removal area could cause unintended scour of the natural cap/MNR portions of the SMA, and how this will be mitigated. Also, it might be useful to expand the discussion about how the combination minimizes short-term effects that might be found from implementing a single technology.
48. Section 6.3.1.5, Long-Term Effectiveness and Permanence
- a. Alternative 1 discussion – MNR has not been demonstrated to be effective on an acceptable timescale in the absence of additional secondary source controls, even decades after primary source controls have been implemented at the Dow Plant site. Other items that are not discussed include: Institutional controls would also be necessary to restrict dredging/bottom disturbance at SMAs (i.e. prop wash, restrictions on dredging, etc.); changes in river morphology could alter the course of the main channel and erode SMA deposits; and long-term risk of deposit loss. In particular, the RP indicates that elevated TEQ is near the surface in some cores of SMA 5-1. Therefore, MNR may not always provide long-term effectiveness in these areas within the SMA.
  - b. Alternative 2 discussion – CCS caps were also used at SMA 2-5 and partially at 2-4. An armor cap was also partially used at SMA 2-4. Dow discovered and repaired a section of the cap at SMA 2-5 that appeared to have been torn up by ice following installation, so this event should be mentioned to capture the lesson learned from BMA 2-5 winter effects, and accompanied by a brief discussion about changes to the installation protocol. This event underscores the need for monitoring and maintenance to ensure long-term effectiveness.
  - c. Alternative 3 discussion – The second paragraph of this section has a discussion of wetlands and endangered species that probably should be in a BMA section.
49. Section 6.3.2:
- a. Alternative 2 – 1<sup>st</sup> paragraph, top of page 75 – There is sentence about access across residential properties to the floodplain and river bank. This section is about the SMAs – is it likely that any residential property access will be needed? However, it

should point out that access to the two currently identified SMAs will be across privately owned property, so we will need to work with the owner, because private owner cooperation can affect implementability. Can anything be said about what we expect regarding owner cooperation for SMA access?

- b. The next sentence states that impacts related to construction support and access will be restored. Please mention that restoring wooded areas will likely be with less mature vegetation.

50. Section 6.3.2, Alternative 3 discussion

- a. 1<sup>st</sup> paragraph on page 76 – Consider adding some discussion about the river being too shallow for some traditional wet removal processes.
- b. In addition to the information on access roads, consider adding some information about the potential upland areas needed for support if wet removal were conducted.
- c. Similar to the Alternative 2 comments, it should be mentioned that private owner cooperation can affect implementability. Also, access to the SMAs does not seem to require crossing residential properties in this case?

51. Alternative 3 (Removal) and Alternative 4 (Combination of In Situ Containment and Removal). As noted previously, it is not clear that a maximum removal depth of four feet will be adequate to meet remedial objectives.

52. Section 6.3.2, Alternative 4 discussion – Please consider augmenting the discussion to point out that for SMA 5-1, a combination alternative maximizes implementability (or minimizes implementation challenges) while minimizing potential short-term impacts.

53. Section 6.3.3 and Appendix C: The RP estimates the cost of MNR monitoring over 30 years at an individual SMA to be \$28,000 (or less than \$1,000 a year). This seems to be quite low – especially if chemical monitoring is required to document the effectiveness of MNR.

54. Section 6.4, page 78, 2<sup>nd</sup> paragraph from bottom – Please mention that additional Segment 3 BMAs will be stabilized in 2016.

- 1) Section 6.4.1.2 – As noted above DEQ does not agree that the 0.1 foot limit with respect to flood elevation increases is accurate.

55. Section 6.4.1.3, Short-term effectiveness

- a. Before this section, please add a section similar to 6.3.1.3 addressing reduction of TMV for the BMA alternatives. Alternatively, 6.3.1.3 could be eliminated and the degree that reduction of TMV is addressed for both SMAs and BMAs could be generally covered in 6.1.1.

- b. Alternative 1 – Where this discusses the time to establish native vegetation, it might be worthwhile to mention that there is a cover crop the first year to provide some surface vegetation and protection.
- c. Alternative 2 – Similar to SMA alternatives, do we want to add some more details than we've provided in the past RPs? For example, the last paragraph on page 81 mentions increased truck traffic. Appendix C provides estimated volume of soil for each 100 feet of bank removed. Might it be useful to provide the approximate numbers of trucks transporting contaminated bank soil this might mean?
- d. Alternative 2 – Several of the BMAs appear to be adjacent to active farm fields – would there need to be enhanced run-off protection to mitigate short-term effects in these areas if banks were removed?

56. Section 6.4.1.4, Long-Term Effectiveness and Permanence

- a. Alternative 1 – Similar to the In-Situ Containment discussion in section 6.3.1.5, it might be useful to briefly discuss the performance of the stabilization technologies during high flow, high shear stress conditions. The oldest treated banks areas are from 2007 – 2009 and there have been high energy events that can help assess the long-term performance of stabilized banks.
- b. Alternative 2 – The last paragraph of this section discusses the J/K removal. Is there any way that the text and maybe figure 5-11 can try to help an unfamiliar reader better understand the scope of a potential removal footprint? J/K was about 1,880 feet – if 5 acres were removed, this translates to about 0.28 acre/100 feet of bank. Another way to look at this might be removal of a bank requires an estimated cutback of X to Y feet from the top of the bank back into the property, depending on bank height.
- c. Page 83. Second paragraph. Please clarify the last sentence in this paragraph as follows (or similar) (additional language in ***italic boldface***): “Long term bank monitoring and adaptive management is not required under this alternative ***if the high TEQ deposit is removed.***”

57. Section 6.4.2, Implementability – Since all of the BMAs are on non-Dow property, can the RP say anything more at this point about landowner willingness to allow access? Several of the BMAs are on public park land – would there be implementation considerations coordinating with park usage? Several of the BMAs appear to be adjacent to active farm fields – would there be implementation considerations coordinating with farm activities?

58. Section 7.1

- a. Please replace EPA website in 2.b with [www.epa.gov/superfund/tittabawassee-river](http://www.epa.gov/superfund/tittabawassee-river)
- b. Please replace 2.e as follows, or similar: “Establishment of local EPA staff who participate in project outreach activities.”

- c. Principle 3 – Please add a sentence at the end as follows, or similar. “EPA coordinates directly with the Saginaw Chippewa Indian Tribe of Michigan regarding the site.”
  - d. Principle 5 – Please add an additional sentence: *Also, monitoring and future residual risk assessment will inform the need for any necessary additional response activities (e.g., the identification of additional BMAs, etc.),* or similar
59. Figure 2-3B does not show the deposit at MM mentioned in the text in Section 2.6
60. Figure 3-4B – It would be useful to have figures similar to Segment 2 RP 3-33A and B for this and any other areas of interest to be addressed in the RP (actual data of each core).
61. Figure 3-10 – It would be useful to blank out Island MM, similar to figure 3-3D.
62. Figures 3-18A and B and 3-20A and B – These figures do not show as NA all of the areas identified as hard surfaces on figures 3-16A and B. In some cases, areas identified as hard surfaces are reported as having undercutting and/or exposed roots. Please reconcile.
63. Figure 3-25 – This figure does not exclude hard surfaces/no response action and includes three stability categories, rather than two.
64. Figure 3-27 – When looking at the bank core distributions there appears to be limited or no data for approximately SW 670 – 676, SW 723 – 744, and NE 662 – 672. These areas have been characterized as low TEQ index, but may need to be treated as data gaps.
65. Appendix B3:
- a. Figure B3-3 – One pin is labeled as both EP3 and EP4, and the maximum differential is listed as 3.6 feet, which is not consistent with the points shown.
  - b. Several figures list an “EP5” when there only appears to be four points. See B3-5, B3-7, B3-17, and B3-20. Please reconcile or provide an explanation in Section 3.4.2.
66. Appendix C – Monitoring is likely to be more frequent than once every five years for many SMA alternatives.

### C. Minor Comments

The following comments would not require revision, but may be worthwhile to address since other comments require document revision.

67. Section 1, 1<sup>st</sup> paragraph – To mirror the information about the other Segments, you may want to add that the Segment 2 RP was approved in June 2013. You may also want to mention that response actions in Segment 3 are expected to start in 2016. Finally – typo, please insert “In November 2013, EPA issued an Action Memorandum for Segment 2 **and** the Segment 2 response actions began in sunnner of 2014

68. Section 2.7.2.3 – Perhaps add a reference for the Segment 1 Response Proposal.
69. Section 2.7.3, last sentence – Change the tense and indicate that the Segment 2 actions “were” implemented, not “are scheduled to be.”
70. Section 2.7.4 – Perhaps add a reference for the Segment 3 Response Proposal. Please consider rewriting “Two distinct SMAs and 10 additional distinct BMAs were identified in the Segment 3 Response Proposal and will be addressed during ~~remedial~~ response actions scheduled in 2016–2017.”
71. Footnote 3, page 16 – Insert “in” after “results.”
72. Section 3.2.1, page 21 – Typo “The results of the 2014 composite sampling were used to calculate the current average surface sediment TEQ concentration ...”
73. Section 3.9.3.5, page 40 – Typo “The cross sections ~~where~~ were then exported into CAD ...”
74. Section 4.3.2.5, p. 51. Please correct: The “US National Oceanic and Atmospheric Administration Fisheries Service” should be “National Oceanic and Atmospheric Administration’s National Marine Fisheries Service”.
75. Section 6.3, page 66 – “In Alternative 4, in situ containment would be implemented in the upstream portion of SMA 5-1 (approximately station 781+00 to 782+75), and removal would be implemented in the downstream portion of SMA 5-1 (approximately station 782+75 to ~~787+50-786+00~~), as shown in Figure 6-1.” Figure 6-1 shows removal to about 786+00.
76. Section 6.3.1.1, page 68 – Put a period at the end of Alternative 4 section.
77. Section 6.3.1.5, page 74 – Put a period at the end of second paragraph Alternative 4 section.
78. Section 6.3.2
- a. Page 75, 3<sup>rd</sup> paragraph – Put a period “which can also be deployed utilizing a shallow draft boat system”
  - b. Page 76, 1<sup>st</sup> paragraph, typos – “...in the upstream portion of the SMA due to challenges associated with installing and maintaining the sheet pile needed to establish a coffer dam in this area. Sheet pile is typically driven until refusal ...”
79. Section 6.3.3, page 77 – The following text from this section would be useful as a footnote to Table C-1: “The cost range for Alternative 2 (In Situ Containment) represents the expected range of costs for implementation of a CCS cap through an armored cap. Similarly, the cost range for Alternative 3 (Removal) represents the expected range of costs for implementation for wet removal and dry removal approaches.”

80. Section 6.4, page 79, 1<sup>st</sup> paragraph – typo “Evaluations of each of the piloted technologies implemented to date have been provided in the *Task 5* ...”
81. Section 6.4.1.3, page 82 – typo “More so than with bank stabilization, worker safety concerns involve working around and operating construction equipment and removing and transporting large amounts of vegetation and soil.”
82. Section 6.4.1.4, page 83 – typo “Based on the results of early removal actions, early vegetation growth (grasses and forbs) would most likely develop under this BMA alternative over a period of two to five years ...”
83. Figure 5-9 – Typo, last box on flow chart should read “Complete Access Agreements ...”